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ABSTRACT

The Water in Africa Project was realized over a 2-year period by a team of Peace Corps volunteers, World Wise Schools (WWS) classroom teachers, and WWS staff members. As part of an expanded, detailed design, resources were collected from over 90 volunteers serving in African countries, photos and stories were prepared, and standards-based learning units were created for K-12 students. Intended for third to fifth grade students, this unit uses the dramatic contrast between the rainy season and the dry season in West Africa--specifically Ghana--to help students learn about climate. Student will define climate, cite its features, discover their area's climate, and apply this knowledge to their study of the ways climate affects people and the environment. The unit can be used in science or geography classes. Four days are needed for completion. The unit lists materials needed, outlines applicable standards, poses discussion questions, and gives student objectives. It details day-by-day procedures for the teacher, provides a rubric for assessment, suggests follow-up/enrichment activities, and lists nine print and on-line resources. (BT)

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World Wise Schools

Water in Africa

Climate and Water in Ghana

http://www.peacecorps.gov/wws/water/africa/lessons/

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Water in Africa is a project of Peace Corps World Wise Schools.

2000

Funded through a grant from the Department of Education, the Water in Africa project was realized over a two year period by a team of Peace Corps Volunteers, World Wise Schools' (WWS) classroom teachers, and WWS staff members. Inspired by an idea of one creative WWS teacher, the project eventually expanded into a detailed design. The development and implementation of the design included the collection of resources from over 90 Volunteers serving in African countries, the preparation of those photos and stories, and the creation of standards-based learning units for K-12 students.

Climate and Water in Ghana

Description:

This unit uses the dramatic contrast between the rainy season and dry season in West Africa to help students learn about climate. Students will define climate, it's features, discover their area's climate, and apply this knowledge to their study of the ways climate affects people and the environment.

Timeframe: 4 days of 4- minute periods

Curricular Areas: Science
Geography

Grade Level: 3-5

Materials

- Photos - http://www.peacecorps.gov/wws/water/africa/countries/ghana/ghanaphotos.html
- Stories from Ghana
- Map of Africa
- Map of Ghana
- The Peace Gallery for a virtual tour of northern Ghana. http://www.peacegallery.org/
- Information on your area's climate from a source such as U.S. Weather Service http://iwin.nws.noaa.gov/iwin/iwdspg1.html
- Homework assignment
- The Climate of Ghana
- Graphic Organizer for Internet Research
- Ghana Climate Projects
- Evaluation Rubric

Standards

Science-Standard 7- Understands how species depend on one another and the environment for survival.

Benchmark-- Knows that changes in the environment can have different effects on different organisms

Geography Standard 7- Knows the physical processes that shape patterns on Earth's surface

Benchmark-- Knows the physical components of Earth's atmosphere (eg. weather and climate), lithosphere (e.g., landforms such as mountains, hills, plateaus, plains), hydrosphere (e.g., oceans, lakes, rivers), and biosphere (e.g., vegetation and biomes).

Geography Standard 15- Understands how physical systems affect human systems

Benchmark-- Knows the ways in which human activities are constrained by the physical environment

Essential Questions

How does where you live affect how you live?

How does climate affect living organisms?

Objectives

- Students will identify the meaning of climate and its five features.
- Students will describe the climate of their region using the features listed above.
- Students will define "drought" and list areas of drought in the United States and the world.
- Students will describe the climate of Ghana using the features listed above.
- Students will demonstrate four effects of the dry season and rainy season on people, plants and animals, and the environment in their projects.
- Students will name at least one method of water conservation in the United States, as well as Ghana

Procedure

Procedure Day One

1. Ask the students to describe the weather outside. Record their answers on the board. Tell them "weather" is the condition of the air at a certain time and place. Ask them what the weather was one month, two months, and six months ago.

2. Write the word "climate" on the board. Tell the students that climate is the pattern of weather that occurs in a place year after year. Describe and write on the board the five most important features of climate: temperature, wind, sunshine, humidity, and precipitation. Classify the student responses to weather conditions in one of these five categories, and add a descriptor for the day's conditions in any category students did not respond (such as humidity).

3. Tell the students that they will be learning about climate and its effects on humans, other living things, and the land for the next few days. In addition, tell the students they will be focusing their attention on these two questions: "How does where you live affect how you live?" and "How does climate affect living organisms?" Point out to the students they should have a good idea how to answer these questions at the end of this unit.

4. Pass out data sheets on climate factors obtained for your state or region from sources such as the U.S. Weather Service or an online encyclopedia. Put the students in

cooperative groups. Ask students to use the data sheets and their own knowledge of weather conditions in their state or region to describe the climate, using as many of the five features as they can. Have each group report back their conclusions, and compare the results to climatologists' descriptions for the area.

5. For homework, ask the students to interview their parents using four questions on their homework sheet. They are: (1) What is a drought? (2) Do you know any areas in the U.S. or the world that are experiencing a drought right now? (3) What is the condition of our regional water source now in terms of the water level? (4) What would you do to conserve water if we were experiencing a drought? What would you want others to do?

Procedure Day Two

1. Begin with a review of what students had learned the day before on climate, including the definition and the five features of climate. Review the day's weather using the five features of climate.

2. Group the students to discuss the homework surveys. Have each group report back to the large group on their results. Record answers on chart paper for each question. Discuss question three in detail if your area is facing a water shortage or a drought. Focus on causes and the length of time it is expected to last. Discuss question four. Tell the student to keep these measures in mind, because they will be learning about a region which deals with water shortages annually. Collect the homework.

3. Introduce Ghana using a world map. Have students make inferences about Ghana's climate. The proximity to the equator should be a factor in their answers. Tell the students that all but the southwest corner of Ghana is part of a region that has only two seasons, a rainy season and a dry season.

4. Write the climate description on the board, " wet and dry tropical." Distribute and explain the climate summary.

5. Tell students they are going to go on a virtual tour of northeastern Ghana through the eyes of a returned Peace Corps Volunteer, Wayne Breslyn. Connect to the Peace Gallery Web Site at www.peace-gallery.org. Take the virtual tour of Bawku, highlighting the rainy season and dry season data which surfaces.

6. Use the information in the "About" section on the Water in Africa Web site to explain to the students how the pictures and stories on the Web site were generated from Peace Corps Volunteers stationed in Africa. Show examples of at least two photos and two stories from Ghana from the list provided on the graphic organizer for internet research. Discuss the photos and stories briefly to help the students see what they can learn from them, focusing on how living in Ghana changes the Volunteers' lives (essential question 1-"How does where you live affect how you live?") and how climate affects life in Ghana (essential question 2-"How does climate affect living things?").

7. Distribute the Graphic Organizer for Internet Research to each student. Explain that research using materials from Peace Corps Volunteers stationed in Ghana will help them find answers to the essential questions. Read over the directions for using the organizer. Demonstrate how to use it by completing an example together. Help the students understand how this graphic organizer can help them record their thoughts about the answers to essential questions one and two, and provide evidence of their learning. Tell them their notes will be the most important material they will need to complete a project on climate in Ghana, which they will start on the following day.

Procedure Day Three

1. Write the proverb on the board "You do me a favor in the dry season, and I'll do you a favor in the rainy season." Ask the students how this proverb relates to what they learned the previous and what they think it means. Discuss briefly.

2. Review the climate data on Ghana, and the information learned during the photo/story sessions the previous day. Tell the students that their groups will be working on project(s) to show what they have learned about Ghana during their computer research. Pass out the Ghana Climate Project guideline sheet and draw the students' attention to the directions on the sheet. Make sure they understand that they are allowed to complete more than one project by dividing into sub-groups.

3. Review the project choices as listed and described in the guidelines:

   A) Create a diorama

   B) Write and present a series of skits

   C) Write and illustrate a magazine article

   (D) Create a Hyperstudio or PowerPoint presentation

4. Discuss the project requirements and answer students' questions. All projects must include four features of the dry season and four features of the rainy season, as they affect people, plants and animals, and the environment. (All three categories must be included.)

   The definition of climate and at least two of the five features of climate must be mentioned in the descriptions of the rainy season and the dry season.

   An example of water conservation must be included. Presentations must be written out for the readers, but will not be graded by the teacher as written assignments unless the group chooses that option. Grades will be based on the oral presentations during the project showcase. The project showcase audience will include other classes in the school, and parents or other adults from the school community. Each group is responsible for its project(s) at the time of the project showcase and for the notes on the graphic organizer(s).

5. Distribute the project rubric. Review the descriptors and the point value for each category. Have students decide on group projects and tasks, including internet research using the graphic organizer. Facilitate the work of the groups on their tasks.

Procedure Day Four

1. Review the group assignments and the tasks necessary to complete group project(s). Make sure the groups are monitoring each subgroup's work, as necessary. Establish a deadline for internet research to be completed and a date for the project showcase.

2. Extend invitations for the project showcase. Set up procedures to photograph, videotape and/or use digital cameras to record the dioramas, skits, and magazine articles, and PowerPoint presentations, (if possible). Students can take the photos, videotapes or a diskette of pictures home to show their parents the project showcase, if their parents were unable to attend that day. The teacher can also use the videotape to complete the assessment rubric on the projects, if necessary.

3. On the day of the project showcase, remind students that their audience may not know much about Ghana. Prepare them for the possibility of questions and discussions based on their projects. Conduct the Project Showcase and congratulate the students on what they have learned.

4. Have students complete individual evaluations of their individual work and their group's work, using the rubric provided, prior to the project showcase.

5. Collect the graphic organizers and the project materials after the project showcase. The students can then use the individual assessments they finished to work on a collective assessment of their group's work. When all the groups have completed their evaluations, collect the papers.

6. Complete assessments for each individual student and each group at the time of the project showcase, or after the project showcase (as time allows). The student's final evaluation should be based on all five of the relevant documents: self-assessment, individual assessment of group work, group assessment of group work, teacher assessment of individual work and teacher assessment of group work. Keep a portfolio with all five documents for each student, as well as a copy of the graphic organizer and the project.

Assessment

Use the rubric for individual and group assessments. See Day Four Procedures for further details.

Follow-up/Enrichment Activities

Study all three of Ghana's climate zones in detail and highlight the differences. Explain why Ghana is used as part of a quick study of Africa by social scientists.

Study other African nations with rainy/ dry seasons, using the Water in Africa site , such as Kenya, Mozambique, and Cape Verde.

Use the list of water conservation measures from the homework and predict which ones would work in villages or cities in Ghana, given the technology available and the local culture.

Study the different landforms of Africa using the resource "A Closer Look at Africa" or an encyclopedia.

Use the internet resources listed below to find out more about droughts in areas such as central Florida, Alabama, or Sudan.

Get the book Bringing The Rain to Kapiti Plain by Verna Aardema to see the dramatic effects of drought and the rainy season in Kenya.

Additional Resources

Aardema, Verna Bringing The Rain to Kapiti Plain, New York: Dial Books, 1992

Angelou, Maya Kofi and His Magic New York: Dutton

David M. Kennedy Center for International Studies, "Culturgram - Republic of Ghana" Provo, Utah: Brigham Young University, 1999

Ghana's official homepage. June 2000. www.ghana.org

National Climate Data Center homepage. June 2000. http://www.ncdc.noaa.gov/

Office of Ground Water and Drinking Water homepage. June 2000. www.epa.gov/OGWDW/

Rogers, Vincent R. People and Places Morristown, New Jersey: Silver Burdett Co.

Society for Visual Education "A Closer Look at Africa" filmstrip/cassette package. Illinois, 1992.

USGS Water Resources of the United States homepage. June 2000. http://water.usgs.gov

About the Author

For over 20 years, Robert Maher has been a fourth grade teacher at Coolville Elementary in the Federal Hocking Local School District in Athens County in Southeast Ohio. He has participated in Peace Corps' World Wise Schools since 1989. Because of proximity to Ohio University and its Ohio Valley International Council, he has been able to incorporate visits by African students into regional studies of Africa on a yearly basis. Robert piloted this lesson in his school and reflected on its success: "The students learned the definition of climate and then applied that definition to their region of Ohio. We also considered how a lack of rainfall affected current

conditions for farmers as part of a questionnaire on drought for homework. The students were fascinated by the material on the Water in Africa Web site as well as the Peace Gallery. The concept of two seasons (rainy, dry) instead of four was interesting to them, and the projects they produced were high quality. They also really liked the idea of pioneering this Web site in Ohio."

PCV Sasha Bennett is washing clothes by hand using two buckets half full of water. One bucket is for lathering and the other is used for rinsing. Her water comes from a water storage tank situated on top of a cement tower.

by Sasha Bennett
Bongo-Soe, Ghana (1999)

This is land reserved for pasture and grazing for donkeys, cattle, goats, and sheep. During the rainy season farmers try to grow their crops on every available piece of land, but some is reserved strictly for livestock purposes.

by Sasha Bennett
Bongo-Soe, Ghana (1999)

This is a groundnut (peanut) farm. Groundnuts are used in many Ghanaian dishes. Ghanaian farmers must wait for the rainy season to grow groundnuts, millet, guinea corn, and rice.

by Sasha Bennett
Bongo-Soe, Ghana (1999)

This is Mr. Haya and his son Dennis. He and his wife have planted high stalks of Guinea corn right next to their house. Farmers plant their crops around their homes and sometimes the crops are so high that they camouflage the homes.

by Sasha Bennett
Bongo-Soe, Ghana (1999)

Ekua Kwaako, a Nursery worker in the Peace Corps Project Nursery in Amisano, Central Region in Ghana, draws water from the reservoir to begin the process of hand-watering thousands of tree seedlings.

by Molly Campbell
Amisano, Ghana (1999)

Margaret and Ekua, workers at the Peace Corps Project Nursery in Amisano, Central Region, water some of the Cassia seedlings. Watering thousands of seedlings during the dry season takes over an hour daily.

by Molly Campbell
Amisano, Ghana (1999)

Peace Corps Project Nursery worker, Anthony Aduafo, buds a rough lemon root stock in order to get a late Valencia tree. Citrus fruits are primary crops in the Central Region, therefore rains are vital.
by Molly Campbell
Amisano, Ghana (1999)

Peace Corps Project Nursery Extensionist James Arthur, clears around a pineapple plot so rains can get to roots. Pineapple is a money making venture in the Central Region. The Peace Corps Nursery Project grows pineapples to sell as a second income Project.

PCV Molly Campbell and Peace Corps Project Nursery workers inspect while the nursery's reservoir is filled. Water is being pumped into the Nursery's reservoir so seedlings can be hand-watered during the dry season.

by Molly Campbell
Amisano, Ghana (1999)

Kojo (whose name means Monday born) is crossing a small stream to a nearby village. This stream is the traditional source of water (drinking and bathing) for the village. Bore holes are now in the village for safe drinking water and to prevent diseases caused by drinking river water.

by Nell Todd
Mafi-Dove, Ghana (1999)

Samuel is pumping water from one of the eight bore holes in the village. The bore holes are a social gathering point for women and children. The pump was specially made in Ghana to allow local people to easily maintain and repair it.

by Nell Todd
Mafi-Dove, Ghana (1999)

This photo is of Prosper and Samuel pouring libations at one of the shrines in the village. The purpose this ritual is to thank the gods for the great things they have done for the people. When pouring a libation one must remove one's shoes.

by Nell Todd
Mafi-Dove, Ghana (1999)

This water pipe is used to pump water from the Volta River to the town of Adidome, where people then fetch water from the standpipes. The Volta River is down-stream from the dam that created the largest manmade lake in the world. Damming the river has damaged its ecology; however, the dam is used for creating electricity in the area.
by Nell Todd, Mafi-Dove, Ghana (1999)

The headmaster is at the fron desk planning lessons with the teachers at an elementary school in Mafi-Dove. Next to him is the water pot at the school that is used to store drinking water for the teachers. The drinking cup is resting on top.

By Nell Todd
Mafi-Dove, Ghana (1999)

This boy is sweeping out the bore hole at the school compound. This is one of the daily chores for the children. The yellow and brown uniforms are worn by children throughout Ghana.

by Nell Todd

Mafi-DoveMafi-Dove, Ghana (1999)

This boy is helping the young girl lift her bucket. Water is so heavy, and generally the containers are so big, that it is impossible to lift them alone.

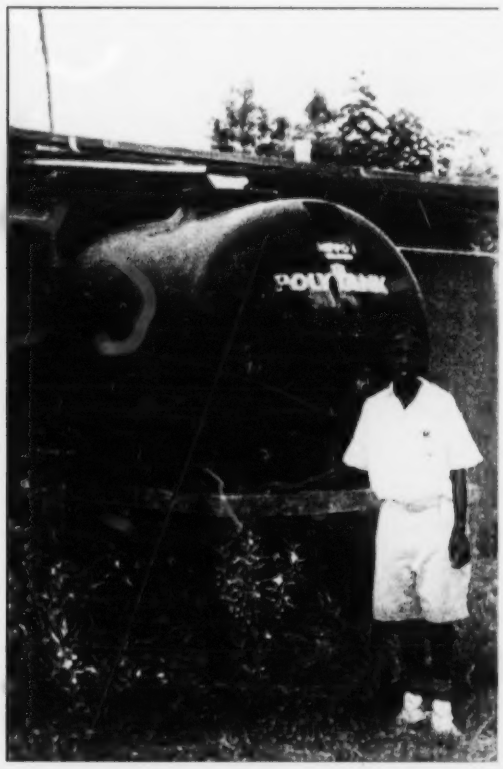
by Amy Wiedemann
Gbefi, Ghana (1999)

A primary student is washing her hands at the school latrine. The tap and poly tank (i.e., running water) are pretty much state-of-the-art technology in the latrines.

by Amy Wiedemann
Gbefi, Ghana (1999)

These children are on their way back from the River Dayi. At dawn and again at dusk there is a virtual highway of water fetchers.

by Amy Wiedemann
Gbefi, Ghana (1999)



Kwame, a Junior Secondary School Form 2 student, is showing off the rain catchment system And poly tank that feeds the tap at the school latrine.

by Amy Weidemann
Gbefi, Ghana (1999)

Two primary school students are washing the cups, basins, tubs, and other items that will be used for drinking and hand washing that day. Every student brings water to school each day, some of it is put in large cans for drinking. There is generally one cup per can so many people drink from the same cup. The water from home is also usedfor hand-washing, scrubbing, and other activities.

by Amy Wiedemann
Gbefi, Ghana (1999)

Kamla, a Junior Secondary School Form 1 student, is washing his hands at the hand washer. There is no water source at the schools-except for the taps with latrines (there are only four taps for over 700 students), hand-washing stands have been made for each classroom. There is not enough water around for fresh water for each wash, but this is a start toward better student hygiene practices.
by Amy Wiedemann Gbefi, Ghana (1999)

"Ice water" is what this little boy yells out as cars pass by. Sold for 50 cedis, it is hand filtered through a sponge and probably contains bits of dirt and feces but many Ghanaians buy it and drink it.

by Steve Tester
Kpong, Eastern Region, Ghana (1999)

Edem is scooping the water from the big basin to a smaller bucket that he can carry. Because of the long lines at the bore hole it is generally more efficient for children to draw the water into a big container and then either make trips with a smaller bucket (like Edem) or call on someone bigger from their house to come and carry it.
by Amy Wiedemann
Gbefi, Ghana (1999)

This is a view of Krobo Mountain. Everything is in bloom during the rainy season.

by Steve Tester
Odumase Krobo, Ghana (1999)

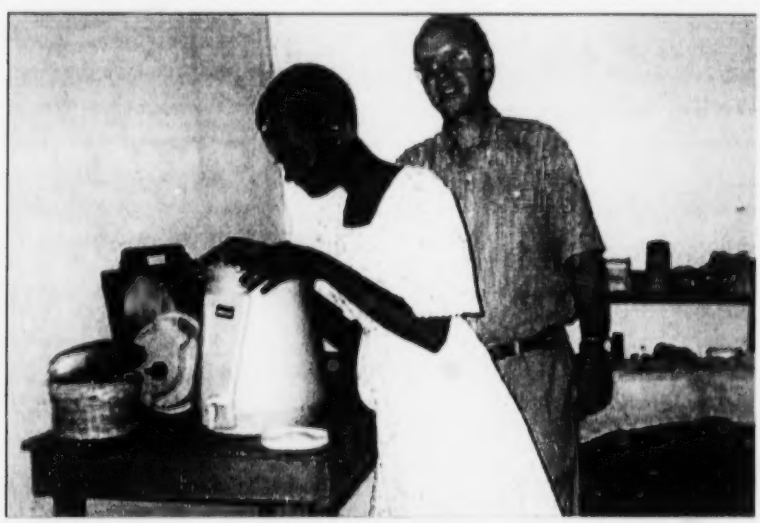
Bathing in the lake is a popular activity for those who cannot afford a bathing stall. Schistosomiasis is a big problem in this area and Lake Volta is one of many sourcesof the disease.

by Steve Tester
Kpong, Eastern Region, Ghana(1999)

This water pump on Lake Volta pulls water out of the lake and shoots it through the over hanging nozzle into trucks. The trucks take the water and wash the roads of dirt and debris during harmattan or they haul it to construction sites.
by Steve Tester
Kpong, Eastern Region, Ghana (1999)

Toga is pulling water from the well in a container made from the inner-tube of an automobile tire.

By Steve Tester
Odumase-Krobo, Ghana (1999)



Gifty Amenu is bringing water to my house. Because I am a teacher, the children do not allow me to carry my own water.

by Chris Botzman
Akome, Volta Region, Ghana
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Gifty Amenu is pouring water into a water barrel. It takes about 7 days to use all the water in my barrel. I use the water for all purposes: bathing, washing dishes, drinking, etc.

by Chris Botzman
Akome, Volta Region, Ghana (1999)

Gifty Amenu is taking a bucket bath. She carried a bucket of water to the shower area and is now taking a bath by pouring the bucket of water over herself.

by Chris Botzman
Akome, Volta Region, Ghana (1999

STORIES FROM GHANA

Water and Culture

The Source of your Water

Daily Usage

Managing Water

Conservation

The Environment and Agriculture

Health and Nutrition

Recreation

Transportation

Other Stories

Water and Culture

by Sasha Bennett, Bongo-Soe, Ghana

The communities in my region of Ghana, the Upper Eastern region, are very much dependent on water. Farmers sow crops in accordance with the rainy season and then harvest the crops when the rainy season ends.

In Bango-Soe, where I am serving as a Volunteer, there is only one rainy season. When the rains come late or if there is a drought, ceremonies are performed. For example, farmers pray to the traditional gods in what is called a "Tinkana." A "Tinkana" is more or less a grove of trees that people don't cut down, as it is believed to "house" spirits and traditional gods. There, people (mostly farmers) pray and sacrifice animals to the gods. Sometimes farmers go to the eldest man in the village to consult gods to bring in the rain. This village elder is not a "witch doctor" or juju man; he is consulted due to his age and wisdom. When the rains come, and when the people are at last able to harvest, they use their produce to buy animals such as goats, fowl or sheep to give to the elder as a sacrifice to the gods.

by Molly Campbell, Amisano, Ghana

While still in Peace Corps training, my host family took me to another home to witness a special ceremony. I had no idea where I was going. Every time I asked, I received an unclear response. Upon arriving, and seeing a group of people in their best African dress, I was informed that it was a "Baby Naming" ceremony. When the baby was brought out, the head of the family took the child and then proceeded to do a type of baptism. First he used water, dipping his finger into the water and dripping the water in to the baby's mouth, saying things in the local language. He then performed the same ritual with palm wine and again with another type of alcohol.

This baby naming ceremony takes place after the baby is born. Family and friends come to pay homage and respect to the parents of the child, helping the child embark on his future life's adventure.

by Amy Wiedemann, Gbefi, Volta Region, Ghana

Water, be it the river and streams or rainfall, is definitely deemed to come from "above." These days, with the spread of Christianity, God receives the credit. However, "in our Father's day" meaning days past, various gods and idols were seen as the rivers and cause of water. The River Dayi, the principle river that passes along my village, was a fetish river. To this day, though, they clearly respect it and its force.

Water also played a vital role in the history of the Ewe people. That is the tribal identity of my village and the surrounding area. A long time ago, all of the Ewe forefathers were held captive

by an evil king, Togbe Agokoli, in the town of Notse in present-day Togo. The evil king imprisoned everyone by surrounding their community with a high, strong wall, and positioning sentries all along the fortress so there was no escape. The Ewe leaders eventually devised a plan and from that day forward, every drop of water was to be thrown out against a designated part of the wall. They made a diversion at the other end of the fortress, and thus were able to flee through the hole and go on to found the villages that one sees today.

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by Steve Tester, Odumase Krobo, Ghana

When you come to a Ghanaian's home the first thing you are offered is a glass of water. This is a sign of welcome. During festivals libation is poured. Water was at one time a libation; now it is common to see gin poured to please the gods.

"Mami" is an excellent example of an endemic goddess that is still alive in the folktales near the coast. She is the goddess of salt-water and brings what is outside in. On Lake Volta at night one should not hope to see comet-like spirits flying along the lake or river. They bring bad luck and the spirits with red "o" shaped mouths are witches that kill those that they see.

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by Chris Botzman, Akome, Volta Region, Ghana

When a baby is born, an elder gives him or her is given a drop of water and says, "This is water." Then the elder gives the baby a drop of wine and says, "This is wine. When you mean water say water and when you mean wine say wine."

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by Michael Nelson, Gbani, Northern Region, Ghana

In Japan and China it is tea. In the United States it may be coffee in the morning, or a soft drink later in the day. In Southern Ghana it is akpateshie (distilled palm wine). In Northern Ghana, it is--quite simply--water.

Water is the drink, not of choice, but of necessity. And, knowing it is a necessity, people consider it an obligation on the part of the host to provide the guest with a calabash (a bowl) filled with water. Giving the guest what one can afford and what is needed: these requirements can be me with a simple serving of water.

Water, however, can transcend this frequent human interaction. Sometimes it becomes an offering to the gods. Here in Gbani, sacrifices--of goats, sheep, chickens, guinea fowl--are still practiced. Sometimes they are associated with a Muslim holiday; sometimes they are associated with traditional animist practices. Always, water is present.

In a water-poor area, such as Gbani, sometimes the sacrifices are for the water itself. I will never forget the day the Chief made a sacrifice in his compound. Only the family members were

present. Our crops were dying from a lack of rain. They needed water. He prayed over the small ancestral mound, a tiny dome near the center of the compound yard. Then, using a calabash full of water, he consecrated that mound. A goat and fowl blood followed soon after. Of course, I was skeptical, but I must admit, the next day it did rain. And for the rest of the season, we did not have to worry about water for our crops.

The Source of your Water

by Molly Campbell, Amisano, Ghana

The rainy season here in the Central Region of Ghana is never the same from year to year. One year there may be an over abundance and the next year a drought. This crazy weather pattern makes it difficult for farmers, market ladies, and families. The worry of water is always on their minds.

There is a seminary about a quarter of a mile from the center of the village, that fortunately has a bore hole that villagers are allowed to use. The water from this bore hole is very clean and can be drunk without treatment. The village also has three wells where clean water can be drawn; however during the dry season the chances of these drying out are common. The river is very near and is still the main source of water for bathing and washing while the wells and bore hole is used for cooking and drinking.

The village also has piped water, however there is a charge to use it so only a small number use the piped water. This is my main source of water. The water comes from Cape Coast, about twelve to fourteen miles from Amisano, therefore it is not always reliable. Pipes break frequently and during the dry season, the water is turned off weekly to help conserve. I have a barrel I keep full, but during water shortages I obtain water from the bore hole.

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by Nell Todd, Mafi-Dove, Ghana

I fetch my water from one of the eight bore holes that are in my village. A bore hole is similar to a well, except it is smaller in diameter and a plastic pipe lines it. At the water table the pipe has tiny holes or slits in it to allow the water to come in. The plastic pipe is surrounded by a sand and gravel mixture, which acts as a natural filter. A pump is attached to the plastic pipe. We draw the water by hand. Each of the eight bore holes has a distinctive taste, and most people have a preference as to which they like best. Some have a salty taste, others have high iron level.

Fetching water is often done by women and small children. The bore holes are not only a source to get water, but it is a social place as well. Often I'll see children playing games (a game similar to rock, paper, scissors, but instead of using your hands girls will jump up and down, moving their legs in different directions while clapping--I still haven't quite figured it out!)

The water that I use has some silt in it due to improper construction of the gravel filter. After it settles for some time it is clear. I put the bore hole water through a filter (which the Peace Corps provides) to make it safe for drinking.

The other source of water is the river. Many people have stopped using it for drinking, but they still like to bathe and wash clothes with it because it lathers well! ("Sister Ana, we use too much soap if we use the bore hole water.")

by Amy Wiedemann, Gbefi, Volta Region, Ghana

In my community there are three sources of water. First, there is the River Dayi and some other smaller streams and tributaries. The community also has two bore holes which are in effect covered hand-dug wells, with manual pumps at the top. And then there is the water from above, rainwater. In my community, the availability of water is not a problem thanks to the tremendous amount of rainfall that we receive. Not only do people collect this rainwater at their homes with gutters that lead to storage drums, but the rain also keeps the River Dayi at a higher level and constant flow. Despite being very hard, the bore hole water is definitely the cleanest and ready for immediate consumption. The rainwater in and of itself is good, however its contact with dusty, metal roofs and dirty gutters generally leaves the first bucket collected quite dirty. The River Dayi remains the number one water source for the people of Gbefi, despite its volume of sediment and dirt. As to the reasons for its top billing, it's the most consistent and has been there the longest, whereas the bore holes are about fifteen years old. Also, there are only two bore holes for a community of around three thousand which leads to a great demand and long lines. There are never any lines at the river.

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by Steve Tester, Odumase Krobo, Ghana

My site is supplied with treated water from KPONG water treatment facility. It is piped from there to a reservoir. From the reservoir it is piped to my school's water tower where it feeds all the pipes all down Adoja hill (my site). Hopefully the water comes once a week. Sometimes water is scarce and, of course, there are no bore holes on mountains.

PCV Jason Felts lives fifteen minutes away from Somanya. He receives the same water that I do; however, the water pipe in Agama Kope, where he lives, is used by two other villages (Ada Kope and Adelekope) giving some 150-160 people water.

PCV Vikki Sturdivant lives thirty to forty minutes away from Somanya. She came to her site to work on water and sanitation. Volivo used water from the Volta Lake (directly) which contains shigella, schistosomiasis, as well as a host of other diseases. She described the flavor as "rancid" (even after filtering and boiling). Volivo now has a bore hole one hundred and fifty meters deep brought by a NGO in December 1997. It feeds approximately one thousand people. She said it's high in iron but it's palatable

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by Chris Botzman, Akome, Volta Region, Ghana

The water I drink comes from a borehole. Water from a borehole is safe to drink without having to boil it. I use a filter, provided by the Peace Corps, which removes any large particles from the water. The filter should be cleaned every week, thus even though the water is classified as clean enough to drink, the filter helps to remove more particles.

Some of the local people get their water from a stream. People also use the stream to wash clothes and their cars. The local people have built up immunities to certain substances in the water that might cause an American to be sick.

I store water in a thirty-gallon container in my house. The children are more than happy to bring the water to my house. I must keep an eye on the small children so they do not contaminate my large container of water. One day a small girl was going to reach into my water container with soap on her hands.

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by Michael Nelson, Gbani, Northern Region, Ghana

About once every two weeks I tell my friend, Tony, that my water is finished. Tony is a British guy that has lived in the neighboring village for twenty six years, working as a linguist and raising two kids with his wife (who was born in New Jersey). He has a donkey cart that I borrow for transporting the water.

My water comes from the open well in his village. My friend in Gbani, Musah, usually does most of the work. (People in the village would almost rather I didn't lift a finger, such is their hospitality.) Musah draws the water from the depths of the well, depositing it into the two large barrels that Peace Corps provides me. This is the water I use for everything: drinking, cooking, bathing, washing dishes, everything. Because the well is open to the air, it isn't very clean. But it isn't too bad. And for drinking I have special filters that Peace Corps gives me to filter the water.

In all these respects, I am lucky. Basically everyone else in my village gets their water from a nearby stream. During the dry season that stream is no longer there and they dig holes in its bed to get water from there. They can spend up to twenty-four hours a day trying to get the water they need. Hopefully, this will soon be better. A well should be finished (with a sealed pump to keep the water clean) very soon. This well will hopefully provide water throughout the dry season as well as the wet season.

Daily Usage

by Sasha Bennett, Bongo-Soe, Ghana

I am probably one of the only WATSAN (Water/Sanitation/Health Education) Volunteers in Ghana with running water. I have a huge water tank, which is on top of a cement mini-water tower and is connected to my faucet and showerhead by plastic pipes. I use water for just about everything: washing clothes, cooking, bathing, and feeding my animals (goat, dog and a baby monkey. I even use a bucket full of water to flush my toilet.

The women and children in our community fetch water throughout the day. They carry the large metal pans of water on their heads.

Until I came here, I did not realize the many uses of water. In the United States we take water for granted. We don't realize that there are still countries in the world where people suffer from the lack of water.

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by Molly Campbell, Amisano, Ghana

Fortunately, here in Amisano we have many sources of water. During the dry season, however, it's sometimes hard to come by. Even though I have piped water, I always boil and filter it before using it. The pipes in Ghana are always breaking and the water isn't always clean. I also use the piped water for washing clothes and bathing.

In my house I have a flush toilet, and I have a sink for washing dishes. The biggest difference and challenge is doing my laundry by hand. I don't use nearly as much water as I did in the U.S. I've come to realize how precious water really is.

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by Nell Todd, Mafi-Dove, Ghana

Instead of taking a shower, I take a bucket bath. Instead of turning on the faucet I turn my water filter tap for drinking water. Instead of putting my clothes in the washer, I put them in a plastic bucket and scrub by hand (oh, my knuckles!). Instead of putting my dishes in the dishwater I put them in another bucket to wash. Instead of having an electric pump that pumps water from our well to the sink, I pump water by hand, carry it to a large blue container, and fetch it when I need it. Instead of having options for what I can drink when I'm thirsty, I always drink water. Water doesn't go down a drain here; when wastewater fills up in a bucket, I throw it into the bushes.

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by Amy Wiedemann, Gbefi, Volta Region, Ghana

My use of water here in Ghana differs tremendously from the way I used and thought about water in the United States. With no running water, every drop counts for me because every drop includes the labor of fetching or collecting, hauling, and storing. I use water for the same things as I did at home, but I use a lot less. Instead of a long hot shower, I use less than one full bucket for bathing. Instead of rinsing food under a faucet, I rinse it in water in a small basin, in which I'll also wash my hands, and add soap and wash my dishes. I store my water in a large drum, but store my drinking water in a separate container to minimize contamination. In addition to bathing and cooking, I use water for washing my clothes and sometimes in cleaning.

The households around me use water in much the same way, but also in a way that relates to their crops. After they've peeled their cassava, they must scrub it well before sending it to the mill. In order to make porridge, they soak the maize overnight before milling it and then boiling it. In times of low rainfall, they haul water from the river to their fields to prevent crops from dying.

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by Steve Tester, Odumase Krobo, Ghana

I get up around 5:30 AM and take my daily bucket bath. I use a whole three gallon bucket because I am 6' 2". I put the water in the kettle for coffee and then after it's down the hatch I'm off to school. By the time my students arrive they have had their early morning bath and are ready to learn.

Our Science Resource center is up and running and hopefully the reserve tank on top of it is full of water for any labs that may occur.

Our kitchen staff is busy with huge cauldrons filled with food. The two huge one thousand gallon reservoir tanks are essential to feed the 490 girls on campus.

After school closes, lines of students form at the student reservoir tanks so they can fill their buckets for the evening bucket bath, and then later on, for the morning bucket bath.

I come home to another bucket bath to wash the grime I have accumulated from the dust in the air and the sweat that has poured from my body. Then I'm back asleep around 8:30 - 9.00 PM. I read that people in the United States average around one hundred gallons per day! I average around seven.

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by Chris Botzman, Akome, Volta Region, Ghana

I have water stored in a thirty-gallon container in my house. I dip water out of the large container to fill all of my needs for water. I have a three-quart filter on my table for drinking water. I need to keep this filled at all times. I have no running water so I cannot just go to a faucet and turn it on.

When I was in the United States I tried to conserve water by taking short showers. In Ghana, I take my bath from one bucket of water (one and a half gallons). Using less water saves it for other people and it also means having to carry less water to my house.

I work at a Senior Secondary School, which is equal to grades ten to twelve in the United States. The students fill a bucket in the staff room each day, so the teachers can wash the chalk from their hands. There is a second bucket in which people dip their cups to get a drink of water.

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by Michael Nelson, Gbani, Northern Region, Ghana

My use of water in Gbani basically mirrors the community's. I began adopting their habits while living in the Chief's compounded during my first three months there. In the morning we all take baths. A "bath" for us, though, consists of filling a bucket with about three or four gallons of water. We scoop that water out with a cup to get our bodies wet. Then we lather up with soap. Finally, we finish with the rinse cycle.

Drinking and cooking can also use a lot of water. In the hot season, I can easily drink more than three liters a day by myself. And then there is also washing dishes. Interestingly enough, in a water poor area like this, it is the practice to take two baths a day. The second being in the evening.

Basically we use water like everyone else in the United States. The primary differences are that the quality of the water is poor and the quantity of water is less.

Managing Water

by Sasha Bennett, Bongo-Soe, Ghana

The official manager of the borehole is called "The Pump Management Team." The team consists of seven to nine members, three or four of whom are women. They are in charge of making sure the surrounding area is clean, and two members are trained to fix boreholes should anything dire happen.

In my opinion, it is the women who manage the borehole. It is the women who come out everyday to pull out weeds between the rocks and around the cement slab. It is the women and children who fetch water to bring to their homes. Men do not take part in fetching water and dismiss it as being "women's or girl's work."

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by Molly Campbell, Amisano, Ghana

In Amisano the women and children usually get water either at the seminary bore hole, (about a quarter of a mile from the center of the village) one of the three wells, the river, or through the pipes. Villagers, however, have to pay for piped water (forty cedis or about three cents a bucket) so not many use this. Farmers do not irrigate; they depend on the rainy season year after year. If a drought occurs, the crops die and there is no food to eat or sell. In the Peace Corps Project Nursery we hand water during the dry season-each tree (thousands of them) getting a small drink one cup of water at a time.

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by Nell Todd, Mafi-Dove, Ghana

Mafi-Dove has a water and sanitation committee, which is in charge of all water facilities. They also work on health education and improving sanitation in the town. As a water and sanitation volunteer, I work directly with this committee. A member of the committee is a trained caretaker of the pumps. The committee has also set up a pump maintenance fund for all upkeep and repairs.

Women usually weed around the bore holes. Women are also in charge of the water in their homes.

Farmers in Mafi-Dove depend on the rain unless they are nursing red pepper near their homes. There are no irrigation systems and farmland is often far from people's homes.

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by Amy Wiedemann, Gbefi, Volta Region, Ghana

Women and children bear the burden of keeping their households supplied with water, through numerous daily trips to and from the bore hole or river. Rainfall is so plentiful in my area that there really isn't an issue of community management, as there is in communities that face drought. For farmers, in times of plentiful rain they deal with the threat of rot, the need for suitable drainage, etc. During times of little rain, they face the enormous task of hauling bucket after bucket of water to save their parched crops. Regretfully, there are no irrigation systems.

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by Steve Tester, Odumase Krobo, Ghana

Water management is truly the responsibility of the woman in almost all Ghanaian households. If the water barrels are low then it is she who tells the children to haul water (by bucket) from whatever the source back to the house. Children are truly the labor force for "menial" tasks in Ghana.

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by Chris Botzman, Akome, Volta Region, Ghana

Adam Akude and Sama Aklaw are responsible for checking the streams for being clean. If the weeds are getting too big they get someone to cut them. The children are responsible for getting water from the bore hole and filling the water barrels at the house.

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by Michael Nelson, Gbani, Northern Region, Ghana

Traditionally, it is the women of Gbani who have been in charge of managing the water supply. Occasionally, they call in men to assist in cleaning debris from the stream or digging from the stream or digging new waterholes along the streamside.
As a Water and Sanitation Volunteer, I have helped alter and expand on that. In Gbani, we have created the Gbani Water and Sanitation Committee, a group of five women and four men charged with leadership, accounting, and proposal writing. And I think it has been successful. Our first well is almost finished and two more are on the way, all on the community's initiative. Additionally, the Committee has initiated a community farm (of soybeans and groundnuts) to raise money for future projects.

Conservation

by Sasha Bennett, Bongo-Soe, Ghana

People usually conserve water in many different ways. Women do laundry once a week with only a small bucket of water. Any excess water left over from washing or bathing, is often given to the animals or is recycled to water dry season crops. People also conserve water by collecting rainwater for drinking and doing other chores during the rainy season.

by Molly Campbell, Amisano, Ghana

Amisano does not really have a conservation program for water.

by Nell Todd, Mafi-Dove, Ghana

I haven't seen a lot of water conservation in the community, though I think they naturally have systems for cooking, bathing, and washing that do not require a lot of water. Everyone (including me) bathes with one bucket of water. Clothes washing is very systematic and efficient. Sometimes they will use "old" water to water plants, and we have planted trees and flowers around the bore holes to help soak up the excess water (thus helping drainage). In general, they use what they need and no more-remember, all water they need they have to fetch and carry on their heads back home.

by Amy Wiedemann, Gbefi, Volta Region, Ghana

Conservation and recycling of water both occur in day to day activities here, seemingly as second nature to the users. Again, my community is fortunate in that they don't face shortage and availability issues. Nevertheless, it takes labor and consumes time to replenish the household water supply; hence, they certainly don't waste what is in the house.

by Steve Tester, Odumase Krobo, Ghana

Water is conserved in some ways in Odumase-Krobo. When families get drinking/cooking water they pay fifty cedis a bucket for water from KPONG. When families get washing/bathing water they get it for free from a well. Babies will be bathed and their bath water will be used to wash an adult. Other than that water is not recycled (at least not that I am aware of). If you pay for something and you're on a limited income, obviously, you will conserve it for the effective use.

by Michael Nelson, Gbani, Northern Region, Ghana

Even in the dry season, when water is getting scarce, you will rarely notice people conserving water. If they do conserve it at all, it is primarily by allowing the children to get by with fewer baths and by not washing clothes as frequently. Both of these solutions help explain the high prevalence of skin problems (rashes, acne, etc.) during that time of the year.

Water is also rarely recycled. The one exception I have noticed is that some people will plant tomatoes and other plants near the outlets of their bath houses, hoping that water will help them

The Environment and Agriculture

by Sasha Bennett, Bongo-Soe, Ghana

Technological advancements in the construction and installation of boreholes and hand-dug wells have improved people's lives. They are now able to take advantage of clean drinking water. Boreholes have a life span of 50 or more years. In fact, we are now trying to replace a 53-year-old borehole. As far as agriculture, farmers plant crops according to seasons. Not many farmers practice dry season farming. People do not like to draw water from the borehole for watering flowers or even crops, as they consider it a waste of good drinking water.

There are dams which were once used for irrigation purposes, but because the dams are so old (some over 50 years) the dammed water dries up during the hot season. But during the rainy season, the dams fill up and farmers use the water from irrigation canals to water their crops before the rain comes. Rice is usually grown around dams.

by Molly Campbell, Amisano, Ghana

I believe Amisano has benefited from technology over the past few years. For example, having piped water available helps with health problems that are consistent with village life. Even though not everyone has it, it is available. As time goes on, more and more people in the community will have the means to obtain it. Having good quality water at the village's disposal whether it is from the piped water, well, or bore hole will have long range benefits for the people in this community.

by Nell Todd, Mafi-Dove, Ghana

The Akosombo Dam was built upriver of Mafi-Dove in the Fifties or the Sixties (I can't remember the exact date). The building of this dam created the largest man made lake in the world, the Lake Volta. However, it caused the Volta River downstream to decrease in volume and the speed/rate at which it flows. Over the years the ecology has changed a great deal, and what was once a rich, fertile area with an abundance of fish has turned into a weedy, marshy, coastal savanna.

Fishing has declined though it is still a prime activity. The increase in weeds has brought bilharzia--a blood fluke that enter one's body through direct contact with infected water (by stepping in it, not drinking it).

There have been no industrial developments in the area which have caused harm to ground water. However, a new rice farm has just been started nearby which will use chemical fertilizers. Run-off will go directly into the river.

by Amy Wiedemann, Gbefi, Volta Region, Ghana

The advent of bore holes, sealed hand-dug wells, and other such technology has definitely improved the accessibility of clean drinking water. Of course, not everyone takes advantage of the bore hole, but the option and choice is there. This option is becoming all the more attractive to many as continued environmental degradation is slowly contaminating the principle water source in my community, the River Dayi. Deforestation and slash-and-burn agricultural practices are increasing the rate of soil erosion and the amount of run-off that lead to the River Dayi. Likewise, all of the various pesticides, growth drugs, etc. are mixing in that run-off. In Ghana, there is not the infrastructure of an efficient and effective FDA and EPA that we find in the United States. Thus many powerful and hazardous chemicals that are banned in the United States are still in use here. So, on one hand, new technology is proving very beneficial to the quality end supply of water, but not so on the other.

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by Steve Tester, Odumase Krobo, Ghana

For a very long time Krobo Girls School has had its water supply from KPONG Water Treatment Facility. In fact, the pump that was purchased seventy years ago came when the school first opened. Recently the pump began to give signs that it was ready to give up the ghost. Once in 1998 the pump stopped working. While the plumber was "trying" to repair it, Krobo Girls Secondary School waited. After waiting over two weeks and giving up bathing for the last three days, the students rebelled. They marched to the head mistress' house and demanded water to bathe. No sooner had five barrels of water been hauled by truck to the school when the water came on.

My secondary project is underway. I have been approved for 5.6 million cedis (2,700 cedis for $1) to purchase a new water pump. The PTA is building a bigger reservoir for the pump. Now, let's hope the electricity holds out.

Planting of crops is synchronized with the advent of the major and minor rainy season.

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by Chris Botzman, Akome, Volta Region, Ghana

Water quality has improved in recent years. The streams are regularly inspected. The bore holes provide clean water.

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by Michael Nelson, Gbani, Northern Region, Ghana

In Gbani, there haven't been many new changes that can be perceived to have affected the quality of water. Perhaps an exception could be the larger scale deforestation that is going on in West Africa. It is still uncertain how people can alter their environments through such actions,

but it is still true that the forests are shrinking in many areas.

Health and Nutrition

by Sasha Bennett, Bongo-Soe, Ghana

The water quality has obviously improved by the installation of boreholes. But even though borehole water is taken deep from the ground, other factors do lead to eventual contamination. If the boreholes are situated far away from houses, the water is fresher than boreholes situated in the midst of houses. This is because of contaminated of ground water from waste disposal: cooking, rubbish and just plain filth. Free range defecation, which is human waste, around or near the borehole area can seep into the ground water and causes contamination. There have also been cases in many district capitals of tiny worms present in borehole water. This is due to excessive dirtiness in or around the borehole.

Once people fetch water, they store it in covered clay pots to preserve the freshness and to prevent dirt and insects from contaminating the water. The clay pots are big, some are two and a half feet high and store a lot of water. Sometimes water in a clay pot is as cold as refrigerator water! I do not store water in a clay pot. I have one but have never been able to use it effectively--whenever I put water in it, it leaks out and brings lots of mosquitoes and flies.

by Molly Campbell, Amisano, Ghana

Except for the river water, most water in Amisano is fairly fresh. Most people in the village use piped, well, or bore hole water for drinking and cooking. The river water is used mainly for bathing and washing clothes. By using the available fresh water, many sicknesses can be eliminated or at least subsided some. I remember when our nursery well was completed and water could be drawn. I asked someone if it was good water, and they said with a smile "It is very very sweet." It struck me funny because I never thought of water as being sweet.

by Nell Todd, Mafi-Dove, Ghana

The bore holes in the town provide safe drinking water. However, many people (esp. older people) don't like the taste of the bore hole water. They grew up drinking river water-"its sweet for them"-and it's when their forefathers drank. It takes time to develop new habits and the bore holes have been in the village for only two years. However, those that still drink river water sometimes boil it-this kills all living germs in it. Drinking water is stored in clay pots inside people's rooms. They keep it covered, and the clay keeps the water cool.

The most common cause of contamination to the river water is human waste. Because there is a lack of latrines in the village many people defecate by the river. Rain carries feces into the water and diseases are spread.

Bilharzia is one of the most common diseases found in this part of Ghana. Worms breed in snails, which live in the weeds and then enter a person. A person who urinates in the water will pass eggs back into the river, creating a cycle. One of the primary symptoms is urinating blood.

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by Amy Wiedemann, Gbefi, Volta Region, Ghana

There are two bore holes in my community that provide clean water, ready for consumption. This promise of clean water leading to good health is still not a strong enough argument to convince everyone in the community to use the bore holes. All previous generations drank from the river. Some of those ancestors lived to be one hundred years old while others died young from causes that had nothing to do with water. It's a tough argument. However, now the residents of Gbefi have a choice as to where they will fetch their water. As community and government health initiatives increase, the choice will become easier. Clean, clear bore hole water from one hundred meters below, or the River Dayi with run-off from the farm, soap suds from the laundry, and plenty of dirt.

The biggest obstacle to increasing clean water accessibility is the cost. This modern, state of the art hydro-technology greatly exceeds the budget of subsistence farmers. Yet I think accessibility is the key. If fetching from a bore hole is easier and more convenient than fetching from the river, everyone will do it without a second thought. Compare it to recycling in the United States. Recycling is beneficial to the environment; no one can argue that. However, fifteen year ago, it was a chore to recycle. You had to store it all in your house until you had time to deliver it to recycling centers. Aluminum went one place, glass to another, paper to a third etc., so the process would take up at least a half of your day. But then came curbside pickup just like the garbage and color coded recycling bins outside of grocery stores. Suddenly, someone who never considered recycling fifteen years ago, is now doing it faithfully. It became easy and convenient to recycle. I believe the same would be true for clean drinking water in Ghana.

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by Steve Tester, Odumase Krobo, Ghana

I am a very lucky Peace Corps Volunteer. I live near KPONG Water Treatment Facility so all my water comes from there. This is due to the fact that I live near the school. Even though my water's fluoride levels fluctuate I have never fallen ill due to contaminated water at my site.

PCV Vikki Sturdivant was not as lucky as I was with respect to water. Her water source was initially from Lake Volta. The water was contaminated and unpalatable if not polluted. She has had tests on the water and found it contained Shigella, bacteria (of all sorts), and schistosomiasis.

Obviously the impact on Ghanaians health is severe. If a worker in the family becomes ill, then it affects the entire family. In some areas water is treated or filtered but hopefully in the near future they will have bore holes to provide water.

I definitely prefer my insipid water to rancid disease carrying water.

by Chris Botzman, Akome, Volta Region, Ghana

The bore hole water is clean. Some people will still walk past a bore hole and go to the stream even for drinking water. I have not heard a reason for going to the stream other than it is what they have always done.

A cover is put over the water barrels when they will not be used. Some of the water barrels are old metal drums. Thus there are particles from the barrel that get into the water.

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by Michael Nelson, Gbani, Northern Region, Ghana

People here have few traditional means to ensure they have clean water. The primary ways are keeping the stream clean and making certain animals and people do not defecate around there. None of these are foolproof solutions, however, as one can never be certain what is happening upstream. Luckily, though, we are free of guinea worm and schistosomiasis, health problems that have ravaged other Ghanaian communities.

Recreation

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by Sasha Bennett, Bongo-Soe, Ghana

Children enjoy playing in water to cool off. Girls, however, do not play in ponds or dams; it is mostly little boys or men. Swimming in pond water and dam water does bring consequences. Because of children/men urinating or defecating in the water, there has been a high rate of bilharzia and schistosomiasis. These two diseases are caused by parasites called blood flukes which are transmitted to other people by the contaminated person defecating or urinating in a body of water. The common symptoms of these diseases are abdominal pain and the urination or defecation of blood. In almost every available body of water, there are children playing, but there are some high prices to pay.

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by Molly Campbell, Amisano, Ghana

There are other uses for water in my village. For example, a few individuals raise fish and they fill their fish ponds with water from the river because their ponds do not have a natural source. Also the local beekeeper uses water in his raising of bees. By keeping water close by, the bees stay closer to their hives.

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by Nell Todd, Mafi-Dove, Ghana

Children swim and fish (a form of fun and food). I don't know any specific water games that children play.

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by Amy Wiedemann, Gbefi, Volta Region, Ghana

Actually, most children in my community do not know how to swim, and thus, rightfully so, are quite timid when the river level rises. Hence, water sports and games are nonexistent.

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by Steve Tester, Odumase Krobo, Ghana

Swimming and bathing go hand in hand. Children go to bathe in Lake Volta and are not only cleaning themselves but also having fun. There are few recreational activities concerning water due to its value and scarceness.

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by Michael Nelson, Gbani, Northern Region, Ghana

Most of the year there really is not enough water for the children to play any water games. This has probably prevented them from developing many water games. Like children everywhere, however, the kids know how to appreciate water. On a hot day during the rainy season, you will find them in the water, jumping puddles, flapping their arms in it, and splashing each other.

People here don't know how to swim but all shallow water that comes with the rainy season is fair play. Indeed, I have seen them playing in the dwindling pools of our dam right up to the point the dry season takes them away.

Transportation

by Nell Todd, Mafi-Dove, Ghana

I live near the Volta River and the sea. The Volta River is mostly used by fishermen. There are only two bridges that cross the river so there are a lot of wooden canoes at various points along the river to shuttle people back and forth. A launch goes the length of the river every other day carrying goods and passengers.

Lake Volta is used as a means to transport materials and people to the northern part of Ghana. The dam is the source of electricity for much of the country.

About two hours from Mafi-Dove is the Tema Harbor, one of two main harbors in the country. This is where much of the importing and exporting takes place. Ships come from all over the world to pick up and drop off goods.

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by Ạmy Wiedemann, Gbefi, Volta Region, Ghana

Travel is quite limited on the River Dayi. The vegetation is so dense on its banks that very few skilled oarsmen maneuver their canoes on it. Those who do are generally small-scale fishermen who sell the fish they catch as a secondary income to their farms. However, less than ten kilometers away is the Lake Volta, one of the largest man-made lakes in Africa. There, steamers and ferries shuttle goods north to south. There are also fishing villages all along its banks, and some of those people will cross the width of the lake to attend markets where they trade their fish for yams, dry goods, etc. All of this transport on the lake is quite dangerous though because there are no enforced regulations on passenger numbers, cargo size, etc., nor a reliable weather service to warn of storms.

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by Steve Tester, Odumase Krobo, Ghana

Many villages along Lake Volta and Volta River are only accessible by boat. Farmers from these villages come to market by boat to sell their produce. These long boats (from 6' to 20' in length) carry passengers, live stock, and produce to and from remote river/lake side villages.

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by Michael Nelson, Gbani, Northern Region, Ghana

During the rainy season there is a dam which olds water into a small lake. And a stream. But neither of these are useful to navigate for travel.

Rain by my village often creates streams and water holes where none before had existed. Because of this, transportation along roads and paths can be difficult. The dirt roads are swept away by erosion, or become impassable streams. People will complain that they can no longer reach their farms without a canoe. Or, their farms could be flooded.

Other Stories

by Sasha Bennett, Bongo-Soe, Ghana

Once, about three months ago, a man came to my compound yelling "Asapoka, Asapoka I have something for you." I did not know nor recognize the man, but he knew my Fra Fra tribal name. My name, Asapoka, was given to me by the village and it means, "A woman from Soe to bring good things." My given name is rather hard for people to pronounce, so most everyone calls me Asapoka.

After the traditional greetings, he pulled out something from his pocket. In his palm, he had what seemed to be a tiny ball of fur. But then it started to move. Imagine my surprise when I saw a little face peeking out from under the fur! The man had a baby porcupine and wanted to give it to me. He got it from the bush which basically means any area that is uninhabited by people. He also told me that a porcupine's quills are boiled, and then pounded into a fine powdery substance to make a traditional medicine. It is given to children to treat stomach ailments. The porcupine sure was cute, but I could not keep it as it would just escape. I know that people eat porcupines, so I was
touched by his gesture of giving me food. I thanked him profusely, and informed him that I could not keep it because I don't eat porcupines. He was very surprised when I told him that most Americans don't eat such things. So the man collected it and put it back in his pocket.

The man was trying to give me a "welcome" gift. He had nothing for me when I came, and waited until he found something I could use. This story should be remembered not by the fact that people here eat porcupines, but rather by the fact that he wanted to give me food. His gesture shows how hospitable and generous Ghanaians are.

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by Molly Campbell, Amisano, Ghana

During the last dry season, the piped water had been turned off for five days. My water barrel was really low so I figured I should get water soon. While sitting outside, my friend Paco was going by with a bucket. He said he was headed to the bore hole. I said I also need water and I'd go with him. I grabbed two buckets and headed out. I figured I'd carry one so I grabbed a head wrap thinking I'd try it on my head, and I'd be a true Ghanaian. Well Stephan didn't think I could, so he got two young boys to come help. Well, I was determined to carry it on my head; of course after hearing "you can't" I was more determined than ever.

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by Nell Todd, Mafi-Dove, Ghana

An essay written by a Middle School student:

In Mafi-Dove water plays many roles during ceremonies. We use water to pour libation and also

during naming ceremony of new born babies. When it is time to name the baby we throw water on top of the building which then fall on the ground. This is done by our grandfathers and grandmothers. When they throw the water it means peace.

In Mafi-Dove we get water from many places. We get our [water] from bore holes. We also get our water form wells and from our river called Mlangoe. These are some of the places that we get our water.

In our farms, we use water to water our crops. Water is one of the cultural practices that we do after transplanting our seedling from the nursery bed to field. We depend on rainwater until the time we harvest the crops.

We use water [in] small, small [amounts] (conserve) only a hard days work. Sometimes, when we are tired it is difficult to go and fetch the water, so the small water that we have in the house, we manage it to do the work we wish do with it. We use it for bathing and cooking.

In Mafi-Dove, to get safe water you should boil it or you fetch from the bore holes or the wells, which we built with Sister Ana (PCV Nell Todd).

In Mafi-Dove, we like to swim in the river. But sometimes we can get Bilharzia by swimming in the water.

In Mafi-Dove, when we want to travel to our district capital, which is across the river Volta, we use our local boat called canoe (tormevu). The canoe is made of wood. We use a paddle or oar to drive the canoe.

In Mafi-Dove, when we want to prepare our local food called banku or akple or soup (detsi) we use water to prepare it. We also use water to wash our clothes.

In Mafi-Dove, we use water to build our houses. One of our local buildings is built from mud. To build a mud house you will mix the dirt with water. After that you can either mould it into bricks or into balls. The bricks one has to dry before you use them. But the balls do not dry before you use them.

In conclusion, these are some of the ways that we use water.

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by Chris Botzman, Akome, Volta Region, Ghana

I am now teaching math for students in their first year at junior school. These students will need to pass a national exam prior to being granted admission to the senior school. My hope is to help them prepare for passing the exam and also to get them prepared for the math in the senior secondary school.

I have also been allowed to use the school for one hour a night, four days a week. I am teaching math to whomever is interested in attending. At my last class there were over fifty students.

Some of the students shared a chair. Sharing chairs is a common practice in Ghana.

Math in Ghana is called Maths or Mathematics. The children in Ghana want to attend school but there is a shortage of teachers. That is why I have been assigned to teach for the Peace Corps in Ghana.

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by Michael Nelson, Gbani, Northern Region, Ghana

Gbani is a village of one thousand people in the Northern Region of Ghana. It lies along a dirt road that stretches from Walewale (the District Capital) to the west and Togo to the east. This is Mamprugu, land of the Mamprusi people, a proud peopele whose traditional capital is at Nalerigu. The most advanced machine in the village is a gas-powered grinding mill used primarily to grind millet and corn.

I spent my first month at the Chief's compound without ever seeing him. This is because he does not live in the village. Instead, people told me he was a "big man" in Accra. I was a bit skeptical, of course, of how "big" this big man could be.

After that first month I went down to Accra to celebrate Christmas. While there, I decided to contact my Chief. It seemed the proper thing to do. I will never forget, though, that first phone conversation. First, his English was incredibly clear. Second, he almost immediately asked me if I had tennis shoes and a tennis racket. I just kept thinking, who is this guy? Does he really play tennis?

He sent his car and driver to pick me up (another shock). And we played tennis! Later we went back to his house where his wife made us these microwave treats while we watched a NBA game on his satellite TV. Dinner was tizzet (the local staple, a stiff porridge made of millet or corn or both) served in silver bowls with white wine. I was blown away.

It might seem strange that a Chief of such a small village could have come into his position. But really, it isn't. His father was King of the Mamprusis and made sure his son got a good education. Chief Musah Badimsugru Adam even got his MBA from Harvard! Now he is head of the Electric Company of Ghana. No, we don't have electricity yet, but it will be coming soon.

---

by Michael Nelson, Gbani, Northern Region, Ghana

Amdia's Story

Hi! I am Amdia Salifu Adam. Actually, Amdia is my own name. Salifu is my father's name. And Adam is our family name. I am ten years old. Also, I am in P5 [Primary Level 5; roughly equivalent to our fifth grade].

At least two times every day it is my job to fetch water from the stream that runs by our village.

My sisters and (sometimes) my younger brother also fetch the water. My mothers often join me. That's right, mothers. Of course, I have only one real mother. Her name is Salamatu. But my father has four other wives as well. This is common here. This means that I have only three real brothers and two real sisters, but my father has at least twenty five other children. They are my half-brothers and half-sisters, but we just call each other brother and sister.

The stream is about a kilometer from our house. It is our only source of water for drinking, cooking, bathing, and washing clothes. Normally, we try to avoid taking water directly from the stream, because we know that it may be dirty. Instead, we dig holes along the edges of the stream to collect the water that comes from the ground there. But sometimes we can't do that because rain has flooded those holes. So we just have to take the stream water.

Fetching water can be difficult, I guess. But I don't really notice it much. This is how we have been getting our water since forever! Also, we get used to carrying the water on our heads from the time we are very young. It's actually quite easy! My friend, Mike, however, seems to have a hard time with it!

When we finally get back to the house we put the water into larger containers. We use this water later for our baths.

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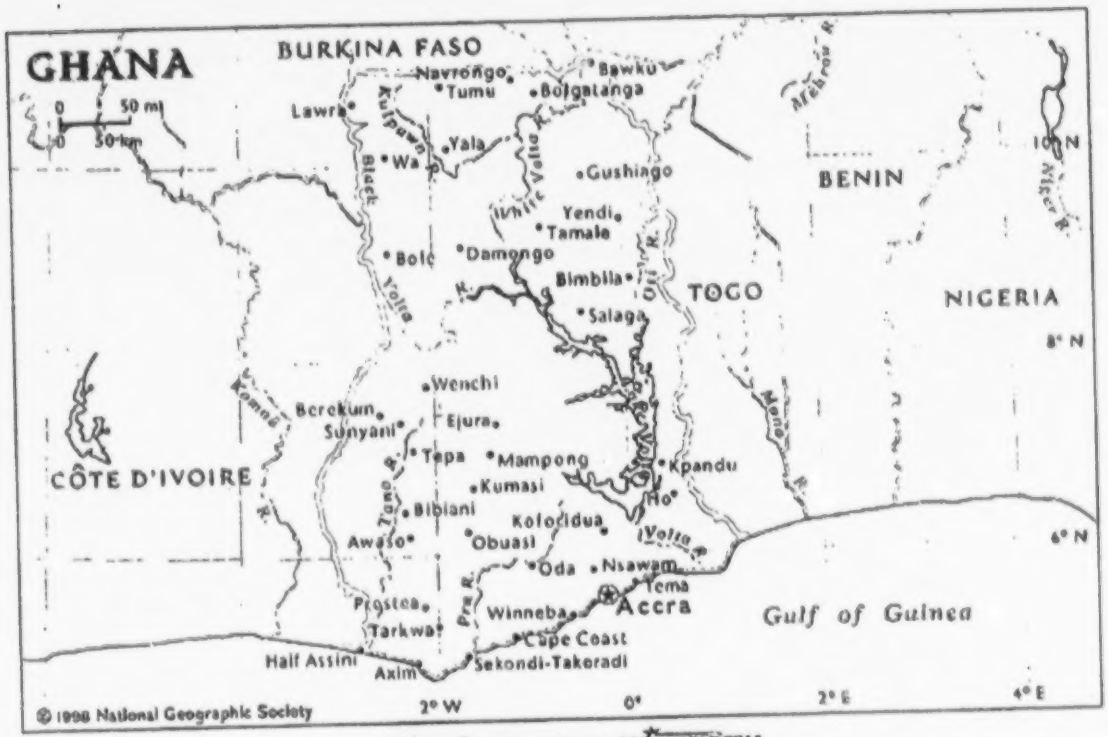

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Name_____**Date** _____

Homework Interview Questions

Directions: Talk to your parents or adult caregiver about these questions. Write their answers in the spaces below the questions.

1. What is a drought?

2. Do you know any areas in the United States or the world that are currently experiencing a drought?

3. What is the current condition of our regional water sources in terms of the amount of water available?

4. What would you do to conserve water if we were experiencing a drought or a water shortage? What would you want others to do?

Name _____

The Climate of Ghana

There are nine different patterns of climate in the world. Climates are classified according to temperature and rainfall. Different areas may have the same average annual temperature or rainfall, but a different kind of climate. This is due to seasonal variations in temperature or rainfall.

The climate in most of Ghana is wet and dry tropical. Wet and dry tropical climates are marked by warm to hot temperatures throughout the year, and abundant rainfall in only one season. This condition is especially noticeable in northern Ghana, because of less annual rainfall and the strictly seasonal nature of the rain. Although this region receives 30 to 40 inches of rain annually, severe dry spells exist from November to March. Most of Ghana receives 40-60 inches of rain annually, characteristic of savanna regions. A large portion of the West Coast of Africa, Central and Eastern Africa is characterized by this same pattern of rainy seasons and dry seasons (wet and dry tropical climate).

A second climate region exists in southwestern Ghana. It has a rainy tropical climate--hot temperatures throughout the year and abundant rainfall (over 80 inches), well distributed throughout the year. Ghana has warm to hot temperatures throughout the year because of its proximity to the equator and its relatively low elevation. The average annual temperature in Accra, Ghana is 80 degrees Fahrenheit (27 degrees Celsius). The northern section of Ghana has hotter temperatures and some seasonal temperature variations because it is farthest from the moderating influence of the ocean, and closest to the Sahara Desert.

Sources:
"Climate."World Book Encyclopedia Millennium 2000 Standard Edition, 1999

"Ghana." World Book Encyclopedia Millennium 2000 Standard Edition1999

"Ghana." Britannica Online June 2000 Encyclopedia Britannica 10 June 2000
http://www.britannica.com/bcom/eb/article/4/0,5716,120134+2+110781,00.html

Graphic Organizer for Internet Research

These worksheets will help you organize your notes on Ghana so that you can find out how life in Ghana, especially northern Ghana, is affected by the climate. There are primarily two seasons in northern and central Ghana—the rainy season and the dry season. These seasons are quite different from the ones we have in North America. The photos and stories listed below are good examples of how Ghana's climate affects the people who live there.

How to Use the Graphic Organizer

As you look at each photo and read each story, decide if it describes conditions in the rainy season, dry season, or all year long and find the appropriate page of the graphic organizer. Then decide if the photo or story tells something about plants and animals, people, or the environment (land, water, air). In the box under the correct heading write a note that tells what you learned from the photo or story. In the "source" column of the same row of the organizer write the photo number or the story title and author. You can use initials to abbreviate the title and author. A sample entry is given below.

All Year

Source	Plants and Animals	People	Environment
GH0101		Sasha Bennet is conserving water by washing clothes in buckets that are half full.	

Requirements

- Look at all the photos and stories, and use the photos and stories you think are the most useful.
- At least one note should be on water conservation, saving water to use later.
- You will need at least four notes for the rainy season and four for the dry season to complete your projects.
- Your notes should include all three categories (plants and animals, people, and the environment) for the rainy season and the dry season.
- You must have notes from both photos and stories, and from both Web sites.
- Your notes should include two features of climate in Ghana (from the five features of climate).
- You may use the same photo or story for more than one note.
- You may also look at the other photos and stories on the Web site for Ghana.

Internet Addresses (URLs)

The Peace Gallery at www.peacegallery.org
Peace Corps' Water in Africa Web site at www.peacecorps.gov/wws/water/africa/

Ghana Photos

GH0106, GH0107, GH0202, GH0203, GH0209, GH0210, GH0213, GH0308, GH0328, GH0402, GH0412, GH0418

Ghana Stories

Conservation: Sasha Bennett, Michael Nelson
Daily Usage: Molly Campbell, Michael Nelson
Managing Water: Molly Campbell
Other Stories: Molly Campbell, Michael Nelson
Recreation: Michael Nelson
The Environment and Agriculture: Sasha Bennett, Steve Tester
The Source of Your Water: Molly Campbell, Michael Nelson
Transportation: Michael Nelson
Water and Culture: Sasha Bennett, Michael Nelson

Graphic Organizer for Internet Research

Rainy Season			
Source	Plants and Animals	People	Environment

Graphic Organizer for Internet Research

Dry Season			
Source	**Plants and Animals**	**People**	**Environment**

Graphic Organizer for Internet Research

All Year			
Source	**Plants and Animals**	**People**	**Environment**

Ghana Climate Projects

Directions: Read the descriptions of the projects given below and think about how they match your group members' talents and interests. Make sure you read about the project requirements, audience, and due dates. Your group may decide to work on one project together, or to divide into sub-groups and do more than one project. The quality of the notes on your graphic organizers is important for your project—make sure each of you complete your research carefully. Use the *Evaluation of Ghana Project* to help you complete the assignment successfully. It lists the expectations and requirements for superior projects and will be used to evaluate your final product.

Project Descriptions

Create a diorama, a three-dimensional form of art with a painted background and figures placed in a descriptive scene in the foreground. Dioramas are usually done in miniature, so the diorama(s) you make should be the size of shoeboxes. Make two (or more) that show the effects of the rainy season and the dry season on the plants, animals, and people of Ghana. The dioramas will be displayed and explained at the project showcase at the end of the unit.

Write and present a series of skits about the rainy season and the dry season in Ghana. The skits can be mimed or contain dialogue. Each skit should be briefly introduced to explain the content and methodology (how you do what you do). Skits can use props and scenery as necessary. Skits can be formally scripted (written and turned into the teacher for evaluation) or informally scripted (evaluated at the time of the performance by what is seen and heard). All skits will be performed at the project showcase.

Write and illustrate a magazine article about life in Ghana. The article should be written in the style of a geographic/nature magazine for kids. It should be aimed at an audience of 8-11 year olds. The article must contain pictures, photos with captions, and text. It will be copied for distribution at the project showcase.

Create a Hyperstudio or PowerPoint presentation about the dry season and rainy season in Ghana, using pictures from the Water in Africa Web site at http://www.peacecorps.gov.wws/water/africa. The presentation should be five to seven minutes long, and contain a minimum of eight photos. The script included in the presentation should contain original material, not merely the Web site picture captions (although excerpts from the captions could be used and cited as sources). The script should be directed at students who are unfamiliar with Ghana and the Web site materials and should include a brief introduction telling students what they will be learning, facts about Ghana as necessary, and a brief conclusion summarizing the presentation.

Project Requirements, Audience, and Due Dates

All projects must include:

- Four features of the dry season and four features of the rainy season, as they affect people, plants and animals, and the environment. (All three categories must be included.)
- The definition of climate and at least two of the five features of climate must be mentioned in the descriptions of the rainy season and the dry season.
- An example of water conservation.

The project showcase audience will include other classes in the school, and parents or other adults from the school community. Each group is responsible the notes on the graphic organizers and for its project(s) at the time of the project showcase.

Evaluation of Ghana Climate Project

Student Name:_____

Project:_____

Area	Points	Descriptors
Content Accuracy	/30	The student: • Showed at least four features each for the rainy and the dry season, and presented all information accurately. • Included effects on humans, plants and animals, and the environment. • Included at least two of the five features of climate in the project. • Included water conservation techniques.
Content Depth	/20	The student: • Displays a sophisticated understanding of how physical processes and changes in the environment affect plants, animals, and people. • Displays a sophisticated understanding of the ways in which human activities are constrained by the physical environment.
Process	/10	The student: • Used photos and stories as resources for the project from the required Internet sites. • Investigated additional resources.
Presentation and Neatness	/20	The student: • Used correct spelling, punctuation, and grammar. • Considered details of appearance, such as spacing and form.
Creativity	/20	The student: • Demonstrated original ideas in presentation content and methods.
Total	/100	

Comments: